



**WISCONSIN DEPARTMENT OF NATURAL RESOURCES
AND
FEDERAL EMERGENCY MANAGEMENT AGENCY
COOPERATING TECHNICAL PARTNERS
MAPPING ACTIVITY STATEMENT**

Mapping Activity Statement No. WDNR04-05-Waukesha

**Digital Flood Insurance Rate Map Production and Development of
Updated Flood Data for Waukesha County, Wisconsin**

In accordance with the Cooperating Technical Partners (CTP) Partnership Agreement dated September 14, 2001 between the Wisconsin Department of Natural Resources (WDNR) and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement (MAS) No. WDNR04-05-Waukesha is as follows.

SECTION 1—OBJECTIVE AND SCOPE

The objective of the Flood Map Project documented in this MAS is to develop a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Waukesha County. The DFIRM and FIS report will be produced in the FEMA DFIRM Format.

Scoping will be necessary to determine the final extent of work for this project. It is expected that the Mapping Partners involved in this project will develop new and/or updated flood hazard data for flooding sources identified in Table 1 (attached).

This Flood Map Project will be completed by the following

- **WDNR**
WDNR study contractor
FEMA Region V
Baker Corporation, under contract to FEMA as National Service Provider (NSP)

WDNR shall notify FEMA and the NSP by e-mail of all meetings with community officials at least one week prior to the meeting (with as much notice as possible). FEMA and/or the NSP may or may not attend the community meetings.

The activities for this Flood Map Project, including required Quality Assurance/Quality Control (QA/QC) reviews, and the Mapping Partners that will complete them are summarized in the table below. The sections of this MAS that follow the table below describe the specific activities, responsible Mapping Partner(s), FEMA standards that must be met, and resultant map components.

ACTIVITIES	CTP	FEMA
Activity 1 – Scoping	X	
Activity 2 – Outreach	X	
Activity 3 – Field Surveys and Reconnaissance	X	
Activity 4 – Topographic Data Development	X	
Activity 5 – Independent QA/QC Review of Topographic Data	X	
Activity 6 – Hydrologic Analyses	X	
Activity 7 – Independent QA/QC Review of Hydrologic Analyses	X	
Activity 8 – Hydraulic Analyses	X	
Activity 9 – Independent QA/QC Review of Hydraulic Analyses	X	
Activity 10A – Floodplain Mapping (Redelineation Using Effective Flood Profiles and Updated Topographic Data)	X	
Activity 10B – Floodplain Mapping (Refinement or Creation of Zone A)	X	
Activity 11 – Independent QA/QC Review of Floodplain Mapping (Revised Areas)	X	
Activity 12 – Base Map Acquisition	X	
Activity 14A – Application of DFIRM Graphic and Database Specifications	X	
Activity 14B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphic and Database Specifications	X	
Activity 15 – Preliminary DFIRM and FIS Report Distribution	X	
Activity 16 – Post-Preliminary Processing	tbd	tbd

FEMA has developed tools to assist in the development of the flood hazard data studies and the Digital Flood Insurance Rate Maps (DFIRMs) that can be used at the WDNR's discretion. The tools available at this time include WISE software and the DFIRM production tools. FEMA will, through the NSP, provide access and training in these tools.

Use of WISE and other FEMA-supplied production tool sets is not required. Should the WDNR choose not to use these production tools, intermediate project data should be submitted to FEMA in accordance with data capture standards at major milestones in each Mapping Project. Submitting data in these standards will aid in more efficient quality control reviews, data storage, archiving, and for future study updates.

The Data Capture Standard submittals will be required at the following study milestones.

Project Scoping (as specified)

Terrain Data Processing Completed

Field Survey Completed

Hydrology Completed (draft and final)

Hydraulics Completed (draft and final)

Coastal Analysis Completed (draft and final)

DFIRM Mapping (draft and preliminary)

QA/QC review activities may be performed by CTPs or the NSP at the discretion of FEMA. Please note the NSP will also be performing periodic audits and overall study/project management to ensure study quality.

FEMA will be providing download/upload capability for intermediate data submittals through the Management Information Portal (MIP). Data submittals uploaded via the MIP will include the same data required prior to the existence of the MIP.

Activity 1 – Scoping

Responsible Mapping Partner: WDNR

Scope: This task involves collecting data from a variety of sources including community surveys, other Federal and State Agencies, NFIP State Coordinators, Community Assistance Visits (CAV's) and FEMA archives. The WDNR will evaluate the effective FIS report and FIRM maps to see if it needs to be updated. Lists of mapping needs will be obtained from the MNUSS database, community surveys and CAV's if available.

Data collection will include obtaining the best available base map materials (corporate limits, roads, orthophotos, etc) along with stream centerline files. The acquired data will be imported into the scoping tool and used during the Scoping Task. In the Scoping Tool all streams should have unique names, the limits of the effective FEMA studies should be identified, LOMC areas should be identified, and community requests should be identified. This task also includes populating the streamlines with existing pipeline and scoped studies currently underway.

In cooperation with the FEMA Region, a Project Management Team will be established consisting of the WDNR, FEMA's regional engineer, Waukesha County, and other appropriate officials. The Project Management Team will be responsible for coordinating the activities of this project and completing all tasks identified in this Statement of Work.

Preliminary Research Activities can be separated into two categories—researching effective information and researching available data for the Flood Map Project. The following tasks shall be completed to research effective information:

- 1 Inventory the FEMA archives for effective FIRM panels, FBFM panels, FIS reports, Other flood hazard data or existing study data
- 2 Summarize the information in the MNUSS database
- 3 Summarize contiguous community agreement checks
- 4 Review CAV and CAC files
- 5 Develop a “scoping map” and an overview of the results of the research

The WDNR will co-ordinate, set-up, and hold the Scoping Meeting. This includes identifying a time, place, and all participants. The purpose of this meeting is to present the current information to the local officials (state, county and municipal) and coordinate on prioritization and identification of study areas. The WDNR shall be responsible for compiling the necessary information for the meeting. These items may include: FIS and FIRM for affected communities; USGS quads for the study area; best available community base map(s); effective FIRM summary; Available Data Inventory; Scoping Map; Scoping Meeting Agenda/Minutes form; Aerial photos/topographic mapping if available; existing drainage studies or other H&H data; Community master plan(s)/Drainage Master Plan(s); Zoning Maps; Street Maps; As-built plans; and Floodplain Ordinance(s).

The project management team shall review the initial mapping needs list, review the research findings, and make selections of proposed methods for obtaining/producing flood data. Any additions or changes to the needs list shall be discussed with all members. All needs shall also be prioritized. In general, highest priority shall be given to the following areas: areas of dense existing or anticipated development, including areas where new road crossings have been constructed over stream(s); areas affected by flood-control structures and/or channelization; areas where natural physical changes in the floodplain have been significant (due to subsidence or extreme erosion, for example); areas that were studied by approximate methods and unmapped areas, especially those with development pressure; areas where the community has experienced flooding outside mapped floodplains, with severe damage to buildings and/or infrastructure; areas where mapped flood hazards do not match those shown on contiguous FIRMs (unless those FIRMs are not considered to be accurate); and areas where flood data (BFEs, floodplains, and regulatory floodways) are likely to be changed the most by a restudy.

Based on the discussion of mapping needs, the WDNR and FEMA Project Officer will finalize the areas to be included in the project (based on recommendations provided by the Project Team). Areas to be studied by detailed and approximate methods shall be identified. The following issues will be discussed and refined: Review and Refinement of Flood Hazard Identification Methodologies, Review of Proposed Paneling Scheme, Review and Refinement of Base and Topographic Map Source, and Finalization of Map Production and Database Options.

Standards: All work under Activity 1 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: The Final Scoping Report shall be delivered with all of the components as laid out in the attached "Partner Flood Map Modernization Program Scoping Report" template in Appendix A in accordance with the schedule outlined in Section 6 for this Activity.

Summary to Date: On October 9, 2003, the WDNR, Southeastern Wisconsin Regional Planning Commission (SEWRPC) and Waukesha County held a meeting of communities in the County at which the FEMA Floodplain Map Modernization Program and the availability of Federal funding for map updates were explained. All communities in the County were asked to provide the following information:

- Changed conditions, such as new or modified hydraulic structures and/or topographic changes
- 2 Local floodplain studies conducted since the FEMA study;
- 3 Streams with approximate or no floodplain delineations along which development is anticipated
- Problems related to the existing floodplain maps
- 5 Community willingness to provide in-kind services for field surveying of hydraulic structures

Based on community responses the WDNR and SEWRPC established the following criteria and point system to provide a systematic approach to assigning overall priorities:

- 6 Points: Population At-Risk. Streams in areas of relatively high population and population growth (growth in residential development) and/or high urban growth other than residential. These areas were identified using planned sewer service areas, community knowledge, the 2020 SEWRPC land use plan, and 1990/2000 U.S. Census data.
- 5 Points: Local priorities as indicated by County/communities in formal responses to WDNR request to communities.
- 4 Points: Reaches where bridges or culverts have been modified, constructed, or removed; where the stream channel or overbanks have been significantly altered; and/or the 100-year flood profile would be significantly affected by land use changes or dam removals/dam failure analyses.
- 3 Points: Streams or stream reaches where a local cost share was offered
- 2 Points: Streams for which there is an existing new or updated WDNR-approved hydrologic and hydraulic study for floodplain delineation.
- Point: A tributary stream, or a reach of a stream, in a subwatershed where a hydrologic analysis was, or will be, developed and used in delineation of floodplains along other streams, or stream reaches. This criterion assumes that the tributary stream or reach would receive a higher priority assignment than if no study was available, based on the assignment of a higher priority to the "other stream(s)."

The determined priorities are listed in Table 1, Priority Listing of Flooding Sources. These priorities may change based subsequent scoping and outreach meetings.

Activity 2 – Outreach

Responsible Mapping Partner: WDNR

Scope: The outreach activities for a Flood Map Project can best be understood as a process that begins during the Project Scoping phase (See Activity 1) and continues through the Map Production and Post-preliminary phases. A regulatory overview of required activities is followed by a description of tools that can be used in working with stakeholders to keep them informed and to solicit their input.

The overarching goal for conducting outreach is to create a climate of understanding and ownership of the mapping process at the State and local levels. Well-planned outreach activities can reduce political stress, confrontation in the media, and public controversy, which can arise from lack of information, misunderstanding, or misinformation. These outreach activities also can assist FEMA and other members of the Project Team in responding to congressional inquiries.

By proactively reaching out to all key stakeholders as early in the Flood Map Project as possible, the maps can be used to their full potential. The likelihood of appeals may also be reduced or eliminated. Specific Contractor activities shall include, but are not limited to -

- ✓ Establishing two-way communication to address the needs of, inform and obtain feedback from, the stakeholders;
- ✓ Ensuring compliance with due process requirements
- ✓ Interacting with technical representatives to ensure production of accurate and up-to-date maps;
- ✓ Enhancing ownership by communities; and
- ✓ Tracking, monitoring, and evaluating outreach activities and adjusting efforts according to ongoing feedback and evolving project needs.

All communication with local governments will be done in accordance with Title 44 Code of Federal Regulations Part 66.

Standards: All work under Activity 2 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon Completion of Outreach and Coordination the Contractor shall deliver the following to the FEMA Regional Project Officer in accordance with the schedule outlined in Section 6 for this Activity:

A report detailing outreach and coordination activities

Backup or supplemental information used in writing this report

Activity 3 - Field Surveys and Reconnaissance

Responsible Mapping Partner: Waukesha

Scope: To supplement any field reconnaissance conducted during the Project Scoping phase of this project, the WDNR shall conduct a detailed field reconnaissance of the specific study area to determine:

The conditions along the floodplain(s)

Types and numbers of hydraulic and/or flood-control structures

Apparent maintenance or lack thereof of existing hydraulic structures

- Locations of cross sections to be surveyed
- Other parameters needed for the hydrologic and hydraulic analyses

In addition to the initial field reconnaissance, the WDNR shall conduct field surveys, including obtaining channel and floodplain cross sections, identifying or establishing Temporary Benchmarks, and obtaining the physical dimensions of hydraulic and flood-control structures. The WDNR also shall coordinate with other Mapping Partners that are collecting topographic data under Activity 4.

Standards: All work under Activity 3 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the Technical Support Data Notebook (TSDN) format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

A report summarizing the findings of the field reconnaissance;

- Maps and drawings that provide the detailed survey results; and
- Survey notebook containing cross sections and structural data.

NSP Format Survey Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/fm_gsam.pdf.

Activity 4 - Topographic Data Development

Responsible Mapping Partner: Waukesha County

Standards: All work under Activity 4 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of topographic data collection and processing for any of the flooding sources listed in Table 1, Priority Listing of Flooding Sources, Waukesha County shall submit these data to the WDNR for an independent QA/QC review under Activity 5 in accordance with the schedule

outlined in Section 6 for this Activity. **Waukesha County** shall submit data for the remaining flooding sources for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, **Waukesha County** shall make the following products available to FEMA:

- Hardcopy topographic maps;
- Report summarizing methodology and results;
Mass points and breaklines data on CD-ROM;
- Digital work maps with contours;
Checkpoint analyses to assess the accuracy of data, including Root Mean Square Error calculations to support vertical accuracy;
Identification of remote-sensing data voids and methods used to supplement data voids;
- National Geodetic Survey data sheets for Network Control Points used to control remote- sensing and ground surveys; and
Metadata compliant with Federal Geographic Data Committee standards.
- NSP Format Terrain Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Summary of Existing Topographic Data: A Countywide digital terrain model (DTM) was compiled in the year 2000 using data collected from 1993 through 2000. More than half of the land area of the County was collected in 2000.

Activity 5 - Independent QA/QC Review of Topographic Data

Responsible Mapping Partner: WDNR

Scope: The WDNR shall review the mapping data generated by **Waukesha County** under Activity 4 to ensure that these data are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM.

Standards: All work under Activity 5 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

A Summary Report that describes the findings of the independent QA/QC review; and

- Recommendations to resolve any problems that are identified during the independent QA/QC review.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/fhm_gsam.pdf.

Activity 6 – Hydrologic Analyses

Responsible Mapping Partner: WDNR

Scope: The WDNR shall perform detailed hydrologic analyses for the approximately 38.1 linear miles of stream for the flooding source(s) listed earlier in this MAS. Additional flooding sources from the MAS may be added, if it is determined that significant development has occurred since the date of the effective floodplain study.

The WDNR shall calculate peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events using the United States Army Corps of Engineers (USACE) Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) and United States Geological Survey (USGS) Hydrologic Simulation Program – Fortran (HSPF) computer programs. These flood discharges will be the basis for subsequent hydraulic analyses under Activity 8. In addition, the WDNR shall address all concerns or questions regarding Activity 4 that are raised during the independent QA/QC review performed by the WDNR during the QA/QC review under Activity 7.

If Geographic Information System (GIS)-based modeling is used, the WDNR shall document automated data processing and modeling algorithms and provide them to FEMA to ensure they are consistent with the standards outlined above. Digital datasets (such as elevation, basin, or land use data) are to be documented and provided to FEMA for approval before performing the hydrologic analyses to ensure the datasets meet minimum requirements. If non-commercial (i.e., custom-developed) software is used for the analysis, then the WDNR shall provide full user documentation, technical algorithm documentation, and the software to FEMA for review before performing the hydrologic analyses.

Existing Hydrology: Streams in the Menomonee and Root River watersheds under a program jointly funded by the Milwaukee Metropolitan Sewerage District (MMSD) and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) are being modeled using the HSPF computer program. The corresponding flood hazard areas are being delineated. Phase 2 of the program is scheduled to be complete by the end of 2006. Portions of the streams in the Rock and Fox River watersheds have been modeled using the HEC-1 and TR-20 computer programs through previous Flood Insurance Studies and individual case-by-case analysis.

Standards: All work under Activity 6 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of hydrologic modeling for the flooding sources listed previously in the MAS, the WDNR shall submit the results to the WDNR for an independent QA/QC review under Activity 7. The WDNR shall submit the results of the remaining flooding source hydrologic analyses for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Digital copies of all hydrologic modeling (input and output) files for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events;
- Digital and hardcopy versions of the Summary of Discharges Table presenting discharge data for the flooding sources for which hydrologic analyses were performed;
- Digital and hardcopy versions of draft text for Section 3.1, Hydrologic Analyses, of the FIS report; and
- Digital and hardcopy versions of all backup data used in the analysis, including work maps.

NSP Format Hydrology Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners

For GIS-based modeling, deliverables shall include all input and output data, intermediate data processing products, and GIS data layers.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/firm_gsam.pdf.

Activity 7 - Independent QA/QC Review of Hydrologic Analyses

Responsible Mapping Partner: WDNR

Scope: The WDNR shall review the technical, scientific, and other information submitted the WDNR under Activity 6 to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. This work shall include, at a minimum, the activities listed below.

Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:

Use of acceptable models;

Use of appropriate methodology(ies);

Correctly applied methodology(ies)/model(s), including QC of input parameters;

Comparison with gage data and/or regression equations, if appropriate; and

Comparison with discharges for contiguous reaches or flooding sources.

- Maintain records of all contacts, reviews, recommendations, and actions and make them readily available to FEMA.

Maintain an archive of all data submitted for hydrologic modeling review. (All supporting data must be retained for 3 years from the date funding recipient submits its final expenditure report to FEMA.)

Standards: All work under Activity 7 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- A Summary Report that describes the findings of the independent QA/QC review and Recommendations to resolve any problems that are identified during the independent QA/QC review.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/fhm_gsam.pdf.

Activity 8 – Hydraulic Analyses

Responsible Mapping Partner: WDNR

Scope: The WDNR shall perform detailed hydraulic analyses for approximately 38.1 miles and limited detail analyses for 92.1 miles of the flooding sources listed earlier in this MAS. The modeling will include the 10-, 2-, 1-, and 0.2-percent-annual-chance events based on peak discharges computed under Activity 6. The hydraulic methods used for this analysis will include the USACE Hydrologic Engineering Center River Analysis System (HEC-RAS) and HEC-2 computer programs.

The WDNR shall use the cross-section and field data collected under Activity 3 to perform the hydraulic analyses. The hydraulic analyses will be used to establish flood elevations and regulatory floodways for the subject flooding sources.

The WDNR shall use the FEMA CHECK-2 or CHECK-RAS checking program to check the reasonableness of the hydraulic analyses. To facilitate the independent QA/QC review under Activity 9, the WDNR shall provide explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate. In addition, the WDNR shall address all concerns or questions regarding Activity 6 that are raised by the WDNR during the independent QA/QC review under Activity 9.

The WDNR shall document automated data processing and modeling algorithms for GIS-based modeling and provide them to FEMA for review to ensure they are consistent with the standards outlined above. Digital datasets are to be documented and provided to FEMA for approval before performing the hydraulic analyses to ensure the datasets meet minimum requirements. If non-commercial (i.e., custom-developed) software is used for the analyses, then the WDNR shall provide full user documentation, technical algorithm documentation, and software to FEMA for review before performing the hydraulic analyses

Where applicable, the cross-section locations of the existing hydraulic models may be converted from USACE HEC-2 data format/USGS E-431 format to GIS (location/orientation using the best available data) and HEC-RAS format. Cross-sections in GIS will be assigned elevations based on the detailed topography and then extracted using HEC-GeoRAS (the USACE GIS extension used to extract model

data to HEC-RAS) or WISE (Watershed Information System developed by Watershed Concepts). The resulting HEC-RAS model based on GIS and HEC-RAS model based on the original HEC-2 data will be merged to create cross-sections with channels based on detailed survey and overbanks based on the detailed topography. Then the model is updated to reflect new or modified hydraulic structures. The model results are generated and exported back to GIS for automatic delineation through the Geo-RAS or WISE extension.

Standards: All work under Activity 8 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of hydraulic modeling for the flooding sources requiring detailed study listed in the MAS, the WDNR shall submit the results to the WDNR for an independent QA/QC review under Activity 9. The WDNR shall submit the results of the remaining hydraulic analyses for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Digital profiles of the 10-, 2-, 1- and 0.2-percent-annual-chance water-surface elevations representing existing conditions using the FEMA RASLOT program or similar software;
- Digital and hardcopy versions of the Floodway Data Table for each flooding source that is compatible with the DFIRM database;
- Digital and hardcopy versions of all hydraulic modeling (input and output) files;
- Digital and hardcopy versions of table with range of Manning's "n" values;
- Explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate;
- Digital and hardcopy versions of all backup data used in the analyses;
- Digital and hardcopy versions of draft text for inclusion in the FIS report.

For GIS-based modeling, deliverables include all input and output data, intermediate data processing products, GIS data layers, and final products in the format of the DFIRM database structure.

- NSP Format Hydraulic Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 9 - Independent QA/QC Review of Hydraulic Analyses

Responsible Mapping Partner: WDNR

Scope: The WDNR shall review the technical, scientific, and other information submitted by the WDNR under Activity 8 to ensure that the data/modeling are consistent with FEMA standards/standard engineering practice and are sufficient to revise the FIRM. This work shall include, at a minimum, the activities listed below.

- Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:

Use of acceptable model(s);

Starting water-surface elevations;

Cross-section geometry;

Manning's "n" values and expansion/contraction coefficients;

Bridge and culvert modeling;

Flood discharges;

Regulatory floodway computation methods; and

Tie-in to upstream and downstream non-revised Flood Profiles.

- Use the CHECK-2 or CHECK-RAS program as appropriate to flag potential problems and focus review efforts.

Maintain records of all contacts, reviews, recommendations, and actions and make them readily available to FEMA.

Maintain an archive of all data submitted for hydraulic modeling review. (All supporting data must be retained for 3 years from the date funding recipient submits its final expenditure report to FEMA.)

Standards: All work under Activity 9 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- A Summary Report that describes the findings of the independent QA/QC review; and
Recommendations to resolve any problems that are identified during the independent QA/QC review.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 10 - Floodplain Mapping (Detailed Riverine)

Responsible Mapping Partner: WDNR

Scope: The WDNR shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for the flooding sources for which detailed hydrologic, and/or hydraulic analyses were performed. The WDNR shall incorporate all new or revised hydrologic and hydraulic modeling and shall use the topographic data acquired under Activity 4 to delineate the floodplain and regulatory floodway boundaries on a digital work map. In addition, the WDNR shall incorporate the results of all effective Letters of Map Change (LOMCs) within the revised areas as appropriate. Also, the WDNR shall address all concerns or questions regarding Activity 10 that are raised by the WDNR during the independent QA/QC review under Activity 11.

Standards: All work under Activity 10 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of floodplain mapping for the 38.1 miles of new detailed study listed earlier in the MAS, the WDNR shall submit the results to the WDNR for an independent QA/QC review under Activity 11. The mapping for the remaining flooding sources is to be submitted for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone labels, and all applicable base map features;

DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*,

- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;

Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale;

- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM;
- Any backup or supplemental information used in the mapping required for the independent QA/QC review outlined under Activity 9; and
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/firm_gsam.pdf.

Activity 10A - Floodplain Mapping (Redelineation of Detailed Floodplain Boundaries Using Updated Topographic Data)

Responsible Mapping Partner: WDNR

Scope: The WDNR shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for the flooding sources listed earlier in this MAS. The WDNR shall use the topographic data acquired under Activity 4 to delineate the floodplain and regulatory floodway boundaries as appropriate on a digital work map. If the new topographic data do not reflect the same hydraulic characteristics as in effective study, the WDNR shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, the WDNR shall contact the FEMA Regional Project Officer identified in Section 12 of this MAS with a recommendation. In addition, the WDNR shall address all concerns or questions regarding Activity 10A that are raised by the WDNR during the independent QA/QC review under Activity 11.

Standards: All work under Activity 10A shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of floodplain mapping for the 183.2 miles of existing detailed study listed earlier in the MAS, the WDNR shall submit the results to the WDNR for an independent QA/QC review under Activity 11. The WDNR shall submit the mapping for the remaining flooding sources for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone labels, and all applicable base map features;
- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale;
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM;
- Any backup or supplemental information used in the mapping required for the independent QA/QC review outlined under Activity 11; and
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/firm_gsam.pdf.

Activity 10B - Floodplain Mapping (Refinement or Creation of Zone A)

Responsible Mapping Partner: WDNR

Scope: The WDNR shall delineate the 1-percent-annual-chance floodplain boundaries for the flooding sources listed earlier in the MAS. The WDNR shall use existing topographic data or the topographic data acquired under Activity 2 to delineate the floodplain boundaries on a digital work map. In addition, the WDNR shall address all concerns or questions regarding Activity 10B that are raised by the WDNR during the independent QA/QC review under Activity 11.

The WDNR may expand on the approaches for analyzing Zone A areas outlined in *Guidelines and Specifications for Flood Hazard Mapping Partners* and in FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas* (April 1995), and/or develop new approaches. Such approaches must be coordinated with the FEMA Regional Project Officer identified in Section 12 of this MAS before analysis and mapping begin.

The WDNR intends that an approximate (limited detail) analyses be done in a manner to provide a sound basis for the development of future detailed analyses that produce adequate flood stages.

Standards: All work under Activity 10B shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of floodplain mapping for the 92.1 miles of existing approximate areas, the WDNR shall submit the results to the WDNR for an independent QA/QC review under Activity 11. The WDNR shall submit the mapping for the remaining flooding sources for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Digital work maps showing the 1-percent-annual-chance floodplain boundary delineations, flood insurance risk zone labels, and all applicable base map features;
- Written summary of the analysis methodologies;
- Any backup or supplemental information, including supporting calculations and assumptions for any computed 1-percent-annual-chance water-surface elevations used in the mapping required for the independent QA/QC review under Activity 11;
- Hardcopy and digital versions of input and output for any computer programs that were used;
- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale; and

- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM.
- NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners

If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/firm_gsam.pdf.

Activity 11 - Independent QA/QC Review of Floodplain Mapping (Revised Areas)

Responsible Mapping Partner: WDNR

Scope: The WDNR shall review the floodplain mapping submitted by the WDNR under Activities 10, 10A, and 10B to ensure that the results of the analyses performed are accurately represented. This work shall include, at a minimum, the activities listed below.

- Review the cross sections for proper location and orientation on the work map and agreement with the Floodway Data Table.
- Review the BFEs shown on the work map for proper location and agreement with the results of the hydraulic modeling.
- Review the regulatory floodway widths for agreement with the widths shown in the Floodway Data Table and the results of the hydraulic modeling.
- Review the floodplain boundaries for agreement with the flood elevations shown in the Floodway Data Table and the contour lines and other topographic information shown on the work maps.
- Review the floodplain widths at cross sections as shown on the work maps to ensure they match the Floodway Data Table.

Review the floodplain boundaries as shown on the work maps to ensure they match the Flood Profiles.

- Review the flood insurance risk zones as shown on the work maps to ensure they are labeled properly.

Review the DFIRM mapping files to ensure they were prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

- Review the metadata files to ensure they include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Standards: All work under Activity 11 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- A Summary Report that describes the findings of the QA/QC review, noting any deficiencies in or agreeing with the mapping results;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and

An annotated work map with all questions and/or concerns indicated, if necessary.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 12 - Base Map Acquisition

Responsible Mapping Partner: Waukesha County

Scope: Activity 10 consists of obtaining the digital base map, orthophoto, for the project. Waukesha County shall provide the digital base map. The required activities are as follows:

- Obtain digital files (raster or vector) of the base map
- Secure necessary permissions from the map source to allow FEMA's use and distribution of hardcopy and digital map products using the digital base map, free of charge.
- Certify that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production.

Populate the DFIRM database with the information required by FEMA

Standards: All work under Activity 12 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, Waukesha County shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Written certification that the digital data meet the minimum standards and specifications and
- Documentation that FEMA can use the digital base map

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 13 – DFIRM Production (Non-Revised Areas)

Responsible Mapping Partner: WDNR

Scope: This activity is not applicable. Based on the scope in Activity , all of the currently mapped streams will be re-delineated and/or remodeled.

Activity 13A – Independent QA/QC Review of DFIRM Production (Non-Revised Areas)

Responsible Mapping Partner: WDNR

Scope: This activity is not applicable. Based on the scope in Activity 1, all of the currently mapped streams will be re-delineated and/or remodeled.

Activity 14 –DFIRM Production (Merging Revised and Non-Revised Information)

Responsible Mapping Partner: WDNR

Scope: This activity is not applicable. Based on the scope in Activity 1, all of the currently mapped streams will be re-delineated and/or remodeled.

Activity 14A – DFIRM Production (Application of DFIRM Graphics and Database Specifications)

Responsible Mapping Partner: WDNR

Scope: The WDNR shall apply the final FEMA DFIRM graphic and database specifications to the DFIRM files produced under Activity 14. This work shall include adding all required annotation, line pattern, area shading, and map collar information (e.g., map borders, title blocks, legends, notes to user) The WDNR shall coordinate with those Mapping Partners responsible for Activities 10, 10A, 10B, 13, and 14, as necessary, to resolve any problems that are identified during Activity 14A.

Standards: All work under Activity 14A shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone labels, and all applicable base map features;

- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*,

Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;

- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale; and
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM.
- NSP Format DFIRM Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 14B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications

Responsible Mapping Partner: WDNR

Scope: Upon completion of the floodplain mapping activities (Activities 10, 10A, and/or 10B) and DFIRM production activities (Activities 13, 14, and 14A), the WDNR shall review the DFIRM to ensure it meets current FEMA graphic specifications. In addition, the WDNR shall review the DFIRM spatial database to determine if it meets current FEMA database specifications. The WDNR shall coordinate with other Mapping Partners, as necessary, to resolve any problems identified during this QA/QC review. This work shall ensure that the requirements below are met.

All required DFIRM features are accurately and legibly labeled and follow the examples shown in the FEMA DFIRM specifications. This includes all flood insurance risk zones, BFEs, cross sections, studied streams, mapped political entities, and all roads within and adjacent to the 1-percent-annual-chance floodplains.

All DFIRM features are correctly symbolized with the appropriate symbol, line pattern, or area shading and follow the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

All map collar information is complete, correct, and follows the requirements specified in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

- DFIRM mapping files are in one of the GIS file and database formats specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners* and conform to those specifications for content and attribution.
- DFIRM database files are in one of the database formats specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners* and conform to those specifications for content and attribution.
- Metadata files describing the DFIRM data include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- The FIS report is prepared in the FEMA Countywide Format as documented in Appendix J of *Guidelines and Specifications for Flood Hazard Mapping Partners*.

Standards: All work under Activity 14B shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- A Summary Report that describes the findings of the QA/QC review noting any deficiencies in or agreeing with the mapping results and the results of all automated or manual QA/QC steps taken during the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- An annotated copy of the DFIRM with all questions and/or concerns indicated, if necessary.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/pdf/fhm/firm_gsam.pdf.

Activity 15 - Preliminary DFIRM and FIS Report Distribution

Responsible Mapping Partners: WDNR

Scope: Activity 15 consists of the final preparation, review, and distribution of the Preliminary copies of the DFIRM and FIS report for community official and general public review and comment. The activities to be performed are summarized below.

15.1 Preliminary Transmittal Letter Preparation. The WDNR shall prepare letters to transmit the Preliminary copies of the DFIRM and FIS report and related enclosures to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

15.2 Preliminary FIS Report Preparation: The WDNR shall prepare the FIS report in the FEMA Countywide Format following the FEMA requirements specified in Appendix J of *Guidelines and Specifications for Flood Hazard Mapping Partners*.

15.3 Final QA/QC Review of Preliminary DFIRM and FIS Report: The WDNR shall perform a final QA/QC review of the Preliminary DFIRM and FIS report, including all data tables, Flood Profiles, and other components of the FIS report. The QA/QC review procedures shall be consistent with the *Guidelines and Specifications for Flood Hazard Mapping Partners*.

15.4 Discrepancy Resolution: The WDNR will work with the WDNR and FEMA as appropriate to resolve discrepancies identified during the final QA/QC review.

15.5 Distribution of Preliminary DFIRM and FIS Report: The WDNR shall distribute the Preliminary copies of the DFIRM and FIS report to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

15.6 News Release Preparation: The WDNR shall prepare news release notifications of BFE changes for all affected communities if appropriate and perform QA/QC reviews of the notices for accuracy and compliance with FEMA format requirements. The WDNR shall file the notifications for later submittal to FEMA for review.

15.7 Preliminary Summary of Map Actions (SOMA) Preparation: The WDNR shall prepare Preliminary SOMAs for all affected communities if appropriate. The SOMA shall list pertinent information regarding LOMCs that will be affected by the issuance of the DFIRM (i.e., superseded, incorporated, revalidated).

Standards: All work under Activity 15 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* and the requirements documented in Section 1 and Appendix A of the *FEMA Document Control Procedures Manual*. The WDNR shall make the products listed below available to FEMA in accordance with the schedule outlined in Section 6 for this Activity.

- Preliminary transmittal letters shall be prepared. These letters and any additional letters requested by FEMA shall be prepared in accordance with the current version of the *FEMA Document Control Procedures Manual*.
- Preliminary copies of the DFIRM and FIS report, including all new or updated data tables and Flood Profiles, shall be prepared.

Preliminary copies of the DFIRM and FIS report, including all updated data tables and Flood Profiles shall be mailed to the Chief Executive Officer (CEO) and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

- Preliminary SOMAs, prepared in accordance with FEMA requirements, shall be provided as appropriate.
- Revised DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.
- Revised DFIRM database files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.
- Revised metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM shall be provided.

Activity 16 - Post-Preliminary Processing

Responsible Mapping Partners: WDNR and FEMA

Scope: Activity 16 consists of finalizing the DFIRM and FIS report after the Preliminary copies of the DFIRM and FIS report have been issued to community officials and the public for review and comment. The activities to be performed are summarized below.

16.1 Initiation of Statutory 90-Day Appeal Period: When required, upon completion of a 30-day community comment period and/or final coordination meeting with the affected communities, FEMA and/or WDNR shall arrange for and verify that the following activities are completed in accordance with the current version of the *FEMA Guidelines and Specifications for Flood Hazard Mapping Partners and Document Control Procedures Manual*:

- Proposed BFE determination letters are sent to the community CEOs and floodplain administrators.
- News release notifications of BFE changes are published in prominent newspapers with local circulation.
- The appropriate notices (Proposed Rules) are published in the *Federal Register*.
- When the WDNR holds public meetings to present and discuss the results of this Flood Map Project, FEMA will attend the meetings and assist where possible if requested.

16.2 Resolution of Appeals and Protests: FEMA and/or the WDNR shall support FEMA in reviewing and resolving appeals and protests received during the 90-day appeal period. For each appeal and protest, the following activities shall be conducted as appropriate:

- Initial processing and acknowledgment of submittal;
- Technical review of submittal;
- Preparation of letter(s) requesting additional supporting data;
- Performance of revised analyses; and
- Preparation of a draft resolution letter and revised DFIRM and FIS report materials for FEMA review.

FEMA's Contractor and/or the WDNR shall mail all associated correspondence upon authorization by FEMA.

16.3 Preparation of Special Correspondence: FEMA's Contractor and/or the WDNR shall support FEMA in responding to comments not received within the 90-day appeal period (referred to as "special correspondence"), including drafting responses for FEMA review when appropriate and finalizing responses when requested by FEMA. FEMA's Contractor and/or the WDNR also shall mail the final correspondence (and enclosures if appropriate) and distribute appropriate copies of the correspondence and enclosures upon receipt of authorization from FEMA.

16.4 Revision of FIRM and FIS Report: If necessary, FEMA and/or the WDNR shall work together to revise the DFIRM and FIS report at the direction of the FEMA Regional Project Officer. FEMA and/or the WDNR will distribute Revised Preliminary copies of the DFIRM/FIS report to the: CEO and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

16.5 Final SOMA Preparation: FEMA and/or the WDNR shall prepare Final SOMAs for the affected communities as appropriate.

16.6 Processing of Letter of Final Determination: FEMA's Contractor and/or the WDNR shall work with FEMA to establish the effective date for the DFIRM and FIS report. A Letter of Final Determination (LFDs) will be prepared for each affected community for FEMA review in accordance with the *FEMA Document Control Procedures Manual*. They also shall mail the final signed LFDs and enclosures and distribute appropriate copies of the signed LFDs and enclosures upon receipt of authorization from FEMA.

16.7 Processing of Final DFIRM and FIS Report for Printing: FEMA and/or WDNR shall prepare final reproduction materials for the DFIRM and FIS report and provide these materials to the FEMA Map Service Center for printing by the U.S. Government Printing Office. FEMA and the WDNR shall also prepare the appropriate paperwork to accompany the DFIRM and FIS report (including Print Processing Worksheet, Printing Requisition Forms, and Community Map Actions Form) and transmittal letters to the community CEOs.

16.8 Revalidation Letter Processing. FEMA and/or the WDNR shall prepare and distribute letters to the community CEOs and floodplain administrators to notify the affected communities about LOMCs for which determinations will remain in effect after the DFIRM and FIS report become effective.

16.9 Archiving Data: FEMA and/or the WDNR shall ensure that technical and administrative support data are packaged in the FEMA required format and stored properly in the library archives until they are transmitted to the FEMA Engineering Study Data Package Facility. In addition, the WDNR will maintain copies of all data for a period of no less than 3 years.

Standards: All work under Activity 16 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* and the requirements documented in Section 1 and Appendix A of the *FEMA Document Control Procedures Manual*, FEMA's Contractor and/or the WDNR shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Documentation that the news releases were published in accordance with FEMA requirements;
- Documentation that the appropriate *Federal Register* notices (Proposed and Final Rules) were published in accordance with FEMA requirements;
- Draft and final Special Correspondence (and all associated enclosures, backup data, and other related information) for FEMA review and signature as appropriate;
- Draft and final Appeal and Protest acknowledgment, additional data, and resolution letters (and all associated enclosures, backup data, and other related information) for FEMA review and signature as appropriate;

- Draft and final LFDs (and all associated enclosures, backup data, and other related information) for FEMA review and signature;
- DFIRM negatives and final FIS report materials, including all updated data tables and Flood Profiles;
- Paperwork for the final DFIRM and FIS report materials
- Transmittal letters for the printed DFIRM and FIS report;
- LOMC Revalidation Letters if appropriate; and
- Complete, organized archived technical and administrative support data

SECTION 2—TECHNICAL AND ADMINISTRATIVE SUPPORT DATA SUBMITTAL

The Project Team members for this Flood Map Project that have responsibilities for activities included in this MAS shall comply with the data submittal requirements summarized below.

All supporting documentation for the activities in this Mapping Activity Statement shall be submitted in the TSDN format in accordance with Appendix M of the *FEMA Guidelines and Specifications for Flood Hazard Mapping Partners*, dated April 2003. Appendix M is available for viewing or download on the FEMA Web site at http://www.fema.gov/pdf/fhm/frm_gsam.pdf. Table 2-1 indicates the sections of the TSDN that apply to each mapping activity.

If any issues arise that could affect the completion of an activity within the proposed scope or budget, the responsible Mapping Partner shall complete a Special Problem Report (SPR) as soon as possible after the issue is identified and submitted to FEMA. The SPR is to describe the issue and propose possible resolutions. (For additional information on SPRs, refer to Appendix M, Subsection M.2.1.1 of *Guidelines and Specifications for Flood Hazard Mapping Partners*.)

The Wisconsin DNR has developed an electronic form of the TSDN format that contains the following information and files:

<i>DIRECTORY</i>	<i>CONTAINS THESE FILES</i>
\TSDN	
\Draft_Flood_Insurance_Study_Report	<ul style="list-style-type: none"> • Draft FIS text • Summary of discharges table • Floodway data table and flood profiles (in one PDF file named 'Exhibits.pdf')

\Engineering_Analyses	
\Hydraulic_Analyses	<ul style="list-style-type: none"> • Hydraulic analyses index • Key to cross section labeling • All supporting hydraulic model files
\Hydrologic_Analyses	<ul style="list-style-type: none"> • Hydrologic analyses index • All supporting hydrologic model files
\Other_Analyses	<ul style="list-style-type: none"> • Supporting files for other analyses • Key to transect labeling (coastal analyses only) • 'Readme' file
\General_Correspondence	
\Contact_Reports	<ul style="list-style-type: none"> • Contact reports index • Supporting contact documentation
\General_Correspondence	<ul style="list-style-type: none"> • All general correspondence • 'Readme' file
\Meeting_Minutes	<ul style="list-style-type: none"> • Meeting minutes / reports index • Supporting meeting documentation
\Special_Problem_Reports	<ul style="list-style-type: none"> • SPR index • Individual special problem reports
\Telephone_Conversation_Records	<ul style="list-style-type: none"> • Telephone conversation documentation • 'Readme' file
\Mapping_Information	<ul style="list-style-type: none"> • Mapping information index • Work map delineation summary • Supporting mapping files (map images, CAD/GIS files, etc.)
\Miscellaneous_Reference_Materials	<ul style="list-style-type: none"> • Miscellaneous reference materials index • Supporting miscellaneous files

Table 2-1. Mapping Activities and Applicable TSDN Sections

TSDN Section	Mapping Activities															
	1	2	3	4	5	6	7	8	9	10, 10A, 10B	11	12	13, 13 A	14, 14 A	15	16
General Documentation																
Special Problem Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Telephone Conversation Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meeting Minutes/Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General Correspondence	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Engineering Analyses																
Hydrologic Analyses			X			X	X	X	X	X	X					
Hydraulic Analyses			X			X	X	X	X	X	X					
Key to Cross-Section Labeling			X			X	X	X	X	X	X					
Key to Transect Labeling			X			X	X	X	X	X	X					
Draft FIS Report						X	X	X	X							
Mapping Information	X	X		X	X					X	X	X	X	X	X	X
Miscellaneous Reference Information	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

SECTION 3—PERIOD OF PERFORMANCE

The mapping activities outlined in this MAS will begin on September 1, 2004, and will be completed no later than September 1, 2006. The mapping activities may be terminated at the option of FEMA or the WDNR in accordance with the provisions of the Partnership Agreement dated September 14, 2001. If these Mapping Activities are terminated; the remaining funds from uncompleted activities, provided by FEMA for this Mapping Activity Statement, will be returned to FEMA.

SECTION 5—STANDARDS

The standards relevant to this Mapping Activity Statement are provided in Tables 5-1 and 5-2. Information on the correct volume, appendix, section, or subsection of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners* to be referenced for each mapping activity are summarized in Table 5-2.

These Guidelines are available for viewing or download from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov/fhm/dl_cgs.shtm.

Table 5-1. Applicable Standards for Project Activities

Applicable Standards	Activities															
	1	2	3	4	5	6	7	8	9	10, 10A, 10B	11	12	13, 13A	14, 14A	15	16
<i>Guidelines and Specifications for Flood Hazard Mapping Partners</i> , April 2003	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
American Congress on Surveying and Mapping Procedures	X		X	X	X											
Global Positioning System (GPS) Surveys: National Geodetic Survey (NGS-510), "Guidelines for Establishing GPS-Derived Ellipsoid Heights," November 1997	X		X	X	X											
Engineer Manual 1110-1-1000, <i>Photogrammetric Mapping</i> (USACE), July 1, 2002	X		X	X	X											
Engineer Manual 1110-2-1003, <i>Hydrographic Surveys</i> (USACE), January 1, 2002	X		X													
"Numerical Models Accepted by FEMA for NFIP Usage," Updated April 2003	X					X	X	X	X							
<i>Content Standard for Digital Geospatial Metadata</i> (Federal Geographic Data Committee), 1998	X	X		X	X					X	X	X	X	X	X	X
<i>Document Control Procedures Manual</i> , December 2000	X	X													X	X
44 Code of Federal Regulations Part 66 and 67		X														

Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications

Activity Number	Activity Description	Applicable Volume, Section/Subsection, and Appendix
1	Scoping	Appendix I and N, Scoping Report document attached in Appendix A to this Mapping Activity Statement
2	Outreach	44 Code of Federal Regulations Part 66 and 67
3	Field Surveys and Reconnaissance	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1)
		Appendix A, Sections A.4, A.5, A.6, A.7, and A.8
		Appendix F, Section F.3
		Appendices B, C, M and N
4	Topographic Data Development	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1)
		Appendix A, Sections A.2 , A.3, A.7, and A.8
		Appendix M and N
5	Independent QA/QC Review of Topographic Data	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.1)
		Appendix A, Sections A.2, A.3, A.7 (specifically Subsection A.7.5), and A.8 (specifically Subsection A.8.6)
		Appendix M
6	Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4)
		Appendix A, Section A.4
		Appendix C, Sections C.1 and C.7
		Appendices E, F, G, H, M and N
6A	Coastal Hazard Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.2.2)
		Appendix A, Section A.4
		Appendices B, D, M and N
7	Independent QA/QC Review of Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1)
		Appendix A, Section A.4
		Appendix C, Section C.2
		Appendices E, F, G, H, and M

Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications (Cont'd)

Activity Number	Activity Description	Applicable Volume, Section/Subsection, and Appendix
7A	Independent QA/QC Review of Coastal Hazard Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1)
		Appendix A, Section A.4
		Appendices B, D, and M
8	Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4)
		Appendix A, Section A.4 (specifically Subsection A.4.7)
		Appendix C, Sections C.3 and C.7
		Appendices B, E, F, G, H, M and N
9	Independent QA/QC Review of Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1)
		Appendix A, Section A.4 (specifically Subsection A.4.7)
		Appendix C, Section C.5
		Appendices B, E, F, G, H, and M
10	Floodplain Mapping (Detailed Riverine or Coastal Analysis)	Volume 1, Section 1.4 (specifically Subsection 1.4.2.3)
		Appendix C, Sections C. 4 and C.6
		Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (specifically Subsection D.3.7)
		Appendices E, F, G, H, K, L, M and N
10A	Floodplain Mapping (Redelineation Using Effective Flood Profiles and Updated Topographic Data)	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.3)
		Appendix C, Section C.6 (specifically Subsection C.6.1.3)
		Appendices K, L, M and N
10B	Floodplain Mapping (Refinement or Creation of Zone A)	Volume 1, Section 1.4 (specifically Subsection 1.4.2.3)
		Appendix C, Sections C.4 and C.6
		Appendices K, L, M and N

Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications (Cont'd)

Activity Number	Activity Description	Applicable Volume, Section/Subsection, and Appendix
11	Independent QA/QC Review of Floodplain Mapping (Revised Areas)	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3)
		Appendix C, Sections C.4 and C.6
		Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (Subsection D.3.7)
		Appendices E, F, G, H, K, L, and M
12	Base Map Acquisition and Preparation	Volume 1, Section 1.3 (specifically Subsection 1.3.1.8) and 1.4 (specifically Subsections 1.4.3.1 and 1.4.3.2)
		Appendix A, Section A.1 (specifically Subsection A.1.1)
13	DFIRM Production (Non-Revised Areas)	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2)
		Appendices K, L, M and N
13A	Independent QA/QC Review of DFIRM Production (Non-Revised Areas)	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2)
		Appendices K, L, and M
14	DFIRM Production (Merging Revised and Non-Revised Areas)	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3 and 1.4.3.3)
		Appendices K, L, M and N
14A	DFIRM Production (Application of FEMA Graphics and Database Specifications)	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3, 1.4.3.3, 1.4.3.9, and 1.4.3.10)
		Appendices K, L, M and N
14B	Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3, 1.4.3.3, 1.4.3.9, and 1.4.3.10)
		Appendices K, L, and M
15	Preliminary DFIRM and FIS Report Distribution	Volume 1, Sections 1.4 (specifically Subsections 1.4.2 and 1.4.3) and 1.5 (specifically Subsection 1.5.1)
		Appendices J, K, L, and M
16	Post-Preliminary Processing	Volume 1, Section 1.5 (specifically Subsection 1.5.2)
		Appendices J, K, L, and M

SECTION 6—SCHEDULE

The activities documented in this MAS shall be completed in accordance with the project schedule below. If changes to this schedule are required, the responsible Mapping Partner shall coordinate with FEMA and the other Mapping Partners in a timely manner.

ACTIVITIES	RESPONSIBLE PARTNER(S)	DATE DUE
Activity 1 – Scoping	WDNR	10/01/2004
Activity 2 – Outreach	WDNR	10/01/2004
Activity 3 – Field Surveys and Reconnaissance	SEWRPC, Waukesha County	12/31/2004
Activity 4 – Topographic Data Development	SEWRPC, Waukesha County	Completed
Activity 5 – Independent QA/QC Review of Topographic Data	WDNR	12/31/2004
Activity 6 – Hydrologic Analyses	WDNR	03/31/2005
Activity 7 – Independent QA/QC Review of Hydrologic Analyses	WDNR	04/30/2005
Activity 8 – Hydraulic Analyses	WDNR	08/30/2005
Activity 9 – Independent QA/QC Review of Hydraulic Analyses	WDNR	09/30/2005
Activity 10 – Floodplain Mapping (Detailed Riverine or Coastal Analysis)	WDNR	05/31/2006
Activity 10A – Floodplain Mapping (Redelineation Using Effective Flood Profiles and Updated Topographic Data)	WDNR	05/31/2006
Activity 10B – Floodplain Mapping (Refinement or Creation of Zone A)	WDNR	05/31/2006
Activity 11 – Independent QA/QC Review of Floodplain Mapping (Revised Areas)	WDNR	06/30/2006
Activity 12 – Base Map Acquisition	SEWRPC, Waukesha County	06/30/2006
Activity 14A – Application of DFIRM Graphic and Database Specifications	WDNR	07/31/2006
Activity 14B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphic and Database Specifications	WDNR	08/15/2006
Activity 15 – Preliminary DFIRM and FIS Report Distribution	WDNR	09/01/2006

ACTIVITIES	RESPONSIBLE PARTNER(S)	DATE DUE
Activity 15 – Preliminary DFIRM and FIS Report Distribution	WDNR	09/01/2006
Activity 16 – Post-Preliminary Processing	WDNR, FEMA	tbd

SECTION 7—CERTIFICATIONS

Certifications must be made at the time the intermediate data is submitted. Relevant certifications are indexed to the following activities:

Field Surveys and Topographic Data Development (Activities 3 and 4)

A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic data, in accordance with 44 CFR 65.5(c). Certification of topographic data by the American Society for Photogrammetry and Remote Sensing is also acceptable.

Hydrologic and Hydraulic Analyses and Floodplain Mapping (Activities 6, 8, 10, 10A and 10B)

A Registered Professional Engineer shall certify hydrologic and hydraulic analyses and data in accordance with 44 CFR 65.6(f).

- A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic information in accordance with 44 CFR 65.5(c).
- Any levee systems to be accredited will be certified in accordance with 44 CFR 65.10(e)

Floodplain Mapping, DFIRM Production and Application of FEMA Graphics and Database Specifications (Activities 10, 10A 10B, 11, 13, 14, and 14A)

The DFIRM metadata files shall include a description of the horizontal and vertical accuracy of the DFIRM base map and floodplain information.

Base Map Acquisition and Preparation (Activity 12)

- A community official or responsible party shall provide written certification that the digital data meet FEMA minimum standards and specifications.
- The responsible Mapping Partner shall provide documentation that the digital base map can be used by FEMA. Please note that uploading base map data to the MIP does not constitute agreement that the digital base map can be used by FEMA. Documentation that the digital base map can be used by FEMA will still be required.

SECTION 8—TECHNICAL ASSISTANCE AND RESOURCES

Project Team members may obtain copies of FEMA-issued LOMCs, archived engineering backup data, and data collected as part of the Mapping Needs Assessment Process from the NSP, who may be contacted by telephone at (312) 707-8770 or by facsimile at (312) 707-8804.

General technical and programmatic information, such as FEMA 265 and the Quick-2 computer program, can be downloaded from the FEMA Web site (<http://www.fema.gov/fhm/>). Specific technical and programmatic support may be provided through the NSP; such assistance should be requested through the FEMA Project Officer specified in Section 12 of this MAS.

Project Team members also may consult with the FEMA Regional Project Officer to request support in the areas of selection of data sources, digital data accuracy standards, assessment of vertical data accuracy, data collection methods or subcontractors, and GIS-based engineering and modeling training

SECTION 9—CONTRACTORS

WDNR intends to use the services of a contractor for this Flood Map Project. WDNR shall ensure that the procurement for all contractors used for this Flood Map Project complies with the requirements of 44 CFR 13.36. Part 13 may be downloaded in PDF or text format from the U.S. Government Printing Office Web site at http://www.access.gpo.gov/nara/cfr/waisidx_04/44cfr13_04.html.

SECTION 10—REPORTING

FINANCIAL REPORTING:

Because FEMA has provided funding to the WDNR, financial reporting requirements for the WDNR will be in accordance with Articles V and VI of the Articles of Agreement.

STATUS REPORTING:

WDNR shall use Earned Value Management System (EVMS) concepts in reporting on status of the project defined by the activities of this Mapping Activity Statement. The EVMS data shall be entered into the web-based Monitoring of Contracted Studies (MICS) or a similar project database module expected to replace MICS at FEMA's new Management Information Portal (MIP) by March 2005. The FEMA Project Officer shall be responsible for providing an EVMS Project Summary Report back to WDNR every 30 days based on a routine export and summary analysis of MICS entries. A report shall also be provided to the FEMA Assistance Officer. The Assistance officer will waive the written quarterly status reports (reference 44 CFR Part 13.40, *Monitoring and Reporting Program Performance*) after evaluation of the timely submittal of the required information by WDNR. However, this shall not affect the financial reporting requirements (reference 44 CFR Part 13.41, *Financial Reporting*).

EVMS baseline data, consisting of start date, end date and all budgeted federal and non-federal resources, shall establish the basis for tracking percent complete and funds expended to date on the project. WDNR shall work with the FEMA Project Officer at the beginning of the project to establish acceptable sub-project tasking for which percent complete and actual cost shall be tracked against baseline data. In general, these tasks shall be derived from major activities enumerated in the table provided at Section 6 of this statement. The tasking will be entered with sufficient resolution to allow project managers the ability to determine which tasks carry the potential for significant cost or schedule variances. Percent complete and actual cost shall be updated with a minimum frequency of 30 days if the project is active. The comment section provided at each MICS task entry should be used as necessary to assist in reporting project status.

Subject to Project Management Team decisions, the WDNR Project Manager may also be responsible for coordinating the production of project status report or "Report to Stakeholders" document. Ideally, this document would be published quarterly and distributed through a web-based posting. Otherwise, FEMA and its NSP contractor may request to meet with WDNR on a routine basis (up to bi-weekly if needed) to review the progress of the project. These meetings will alternate between FEMA's Regional Office, the WDNR office and conference calls as necessary.

Section 11—PROJECT COORDINATION

Throughout the project, all members of the Project Team will coordinate, as necessary, to ensure the products meet the technical and format specifications required and contain accurate, up-to-date information. Coordination activities shall include:

Meetings, teleconferences, and videoconferences with FEMA and other Project Team members;

Telephone conversations with FEMA and other Project Team members on a scheduled basis and an ad hoc basis, as required;

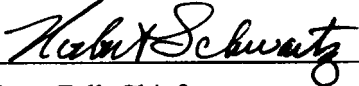
Updates to the MICS, Mapping Needs Update Support System database, and other FEMA status information systems in accordance with requirements in Volumes 1 and 3 of *Guidelines and Specifications for Flood Hazard Mapping Partners*, and

E-mail, facsimile transmissions, and letters, as required.


Ssection 12—points of Contact

The CTP Project Manager is AmandaSchwoegler-Boos or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. Bob Watson, P.E., will serve as WDNR Project Engineer for execution of this MAS. The FEMA contacts are: Ken Hinterlong, Project Officer, and Lee Traeger, Technical Monitor. The NSP representative for this MAS is Mark Hoskins, P.E., Technical Manager for the NSP Regional Management Center located in Chicago.

Each party has caused this Mapping Activity Statement to be executed by its duly authorized representative.

for 
Terry Fell, Chief
Hazard Identification and Risk Assessment Branch
Federal Emergency Management Agency, Region V

8-26-04
Date


Richard Wedepohl, Chief
Dam, Floodplain and Shoreland Management Section
Bureau of Watershed Management
Wisconsin Department of Natural Resources

9/9/04
Date

**Table 1 – Priority Listing of Flooding Sources
Waukesha County Digital Flood Insurance Rate Map project**

Mapping Activity Statement WDNR04-05-Waukesha

Flooding Source¹	Stream Length (miles)			
	Detailed H&H	Limited Detail Methods	Redelineate Using Effective Flood Profiles	Total Length
Pewaukee River (Pewaukee Lake)	0.4		10.5	10.9
Bark River (Upper & Lower Nemahbin Lakes, Crooked Lake, Bowron Lake, Duck Lake, Nagawicka Lake)	14.2		18.8	33
Zion Creek (Tributary to Pewaukee Lake)	1.7			1.7
South Branch of Sussex Creek			3.3	3.3
Rosenow Creek	3.8			3.8
Willow Springs Creek (Tributary No. 1 to the Fox River)			5.3	5.3
Unnamed Tributary to Sussex Creek			1.8	1.8
Scuppernong Creek (Hunters, Dutchman, and Waterville Lakes)	13.6			13.6
Quietwood Creek			2.1	2.1
Brandy Brook		5.2		5.2
Mukwonago River (Phantom Lake, Upper Phantom Lake, Eagle Spring Lake)		1.1	12.4	13.5
Fox River			42.1	42.1
Calhoun Creek (Linnie Lac)		0.6	4.3	4.9
Linnie Lac Tributary	2.4			2.4
Deer Creek			4.1	4.1
Jewel Creek			0.7	0.7
Muskego Canal (Muskego Lake, Little Muskego Lake)			5.2	5.2
Genesee Creek		1.7	5	6.7
Spring Creek (Spring Lake)		6.5		6.5
Unnamed Tributary No. 2 to Brandy Brook		1.2		1.2

Table 1 – Priority Listing of Flooding Sources (Cont'd)

Flooding Source¹	Stream Length (miles)			
	Detailed H&H	Limited Detail Methods	Redelineate Using Effective Flood Profiles	Total Length
Unnamed Tributary No. 2 to Brandy Brook		1.6		1.6
Unnamed Tributary No. 3 to Brandy Brook		2.9		2.9
Unnamed Tributary No. 3 to Scuppernong Creek		1.3		1.3
School Section Lake Tributary to Bark River		6.5		6.5
Unnamed Tributary No. 1 to School Section Lake Tributary		2.2		2.2
Unnamed Tributary No. 2 to School Section Lake Tributary		1.6		1.6
South Unnamed Tributary to Pewaukee Lake		2		2
Pewaukee Lake Tributary		1.3	1.4	2.7
West Branch Pewaukee Lake Tributary			0.3	0.3
Unnamed Tributary No. 1 to West Branch Pewaukee Lake Tributary		3.4		3.4
Mill Brook		3.5	0.8	4.3
Pebble Creek			9.3	9.3
Total	36.1	42.6	127.4	206.1

¹ Listed in order of priority determined within the SCOPE OF WORK FOR PROPOSED DIGITAL FLOODLAND MAPPING FOR WAUKESHA COUNTY prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC)